1996-97 DRIVE AXLES

Drive Shafts & Universal Joints - Trucks

MODEL IDENTIFICATION

Vehicle model can be identified by fifth character of Vehicle Identification Number (VIN), stamped on metal pad on top of left end of instrument panel, near windshield. See **MODEL IDENTIFICATION** table.

MODEL IDENTIFICATION

Series (1)	Model
"C"	2WD Pickup, Sierra, Suburban, Tahoe & Yukon
"G"	(2) RWD Van
"K"	4WD Pickup, Sierra, Suburban, Tahoe & Yukon
"L"	AWD Astro & Safari
"M"	2WD Astro & Safari
"P"	Commercial Van & Motorhome
"S"	2WD Blazer, Jimmy, Pickup & Sonoma
"T"	4WD Blazer, Jimmy, Pickup & Sonoma
"T"	AWD Bravada

(1) Fifth character of VIN.

(2) Includes Express, G-Van and Savana.

DESCRIPTION

CONSTANT VELOCITY JOINTS

Constant Velocity (CV) joints are used on AWD "L" and "T" series and 4WD Tracker, "K" and "T" series vehicles. These joints are located at axle end of drive shaft. A cage contains 6 balls inside CV joint. See appropriate FRONT AXLE article.

DRIVE SHAFTS

Drive shafts may have one shaft, 2 shafts with a center bearing, or 3 shafts with slip joints. Three shafts are used on 4WD vehicles. Location of slip joints vary with model application. See **Fig. 1** .

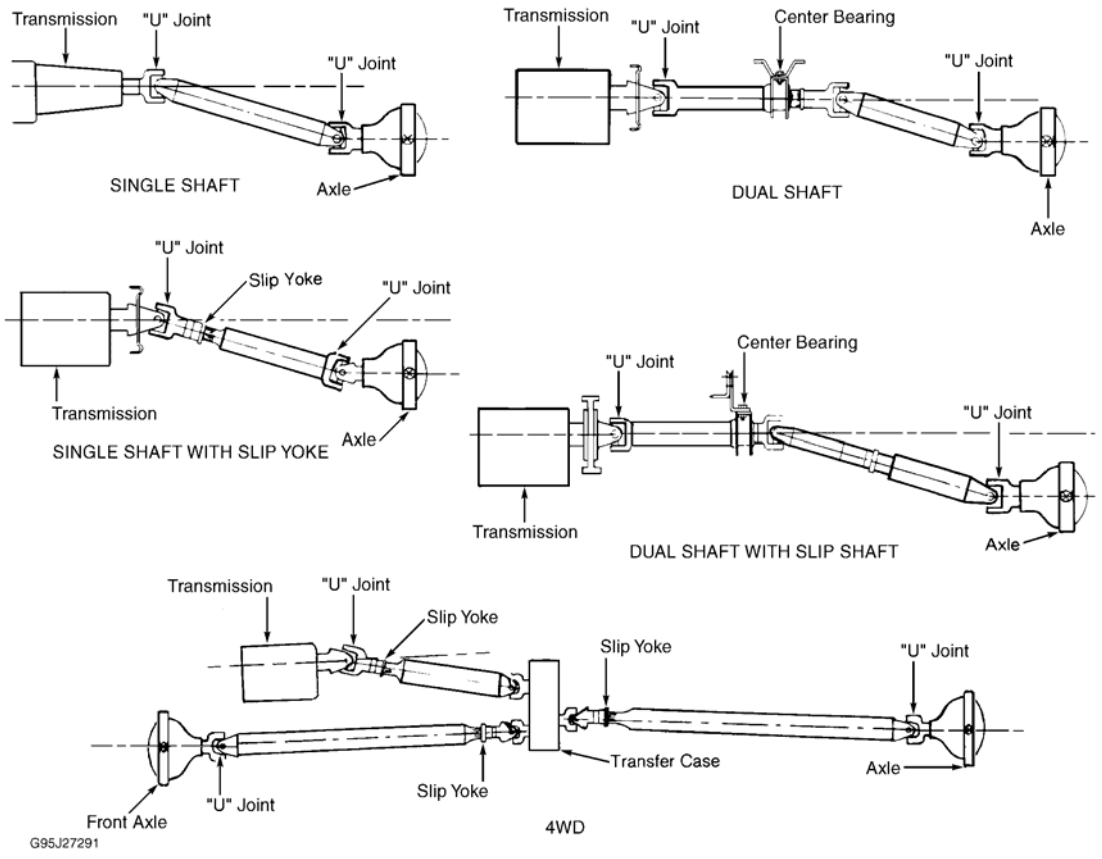

Fig. 1: Identifying Commonly Used Drive Shaft Combinations

UNIVERSAL JOINTS

Universal joints compensate for the effects of vehicle loading and axle windup present during acceleration. When operated within designed angle variations, a universal joint will operate effectively. When the design angle is changed or exceeded, operational life of joint will decrease.

On a driveline with a designed deep angle, a double cardan joint is used in place of a simple universal joint. A double cardan joint is composed of 2 universal joints, coupled by a yoke and phased for constant velocity. A ball socket between the 2 universal joints serves as a centering device. See **Fig. 2** . This causes each of the 2 units to operate through half of the complete angle between drive shaft and differential carrier.

Needle roller bearings are used in universal joints. Needles are held in place on the trunnions by round bearing cups. Bearing cups are held in the yokes either by snap rings or injected plastic retainers.

INSPECTION

DRIVELINE

If abnormal vibration or driveline noise is present, check these sources of possible vibration before overhauling

driveline:

Drive Shaft

Check drive shaft for damage or dents. Check for undercoating adhering to shaft. If present, clean shaft thoroughly.

Universal Joints

Check for foreign material stuck in joints. Check for loose bolts, worn bearings and rust showing lack of grease.

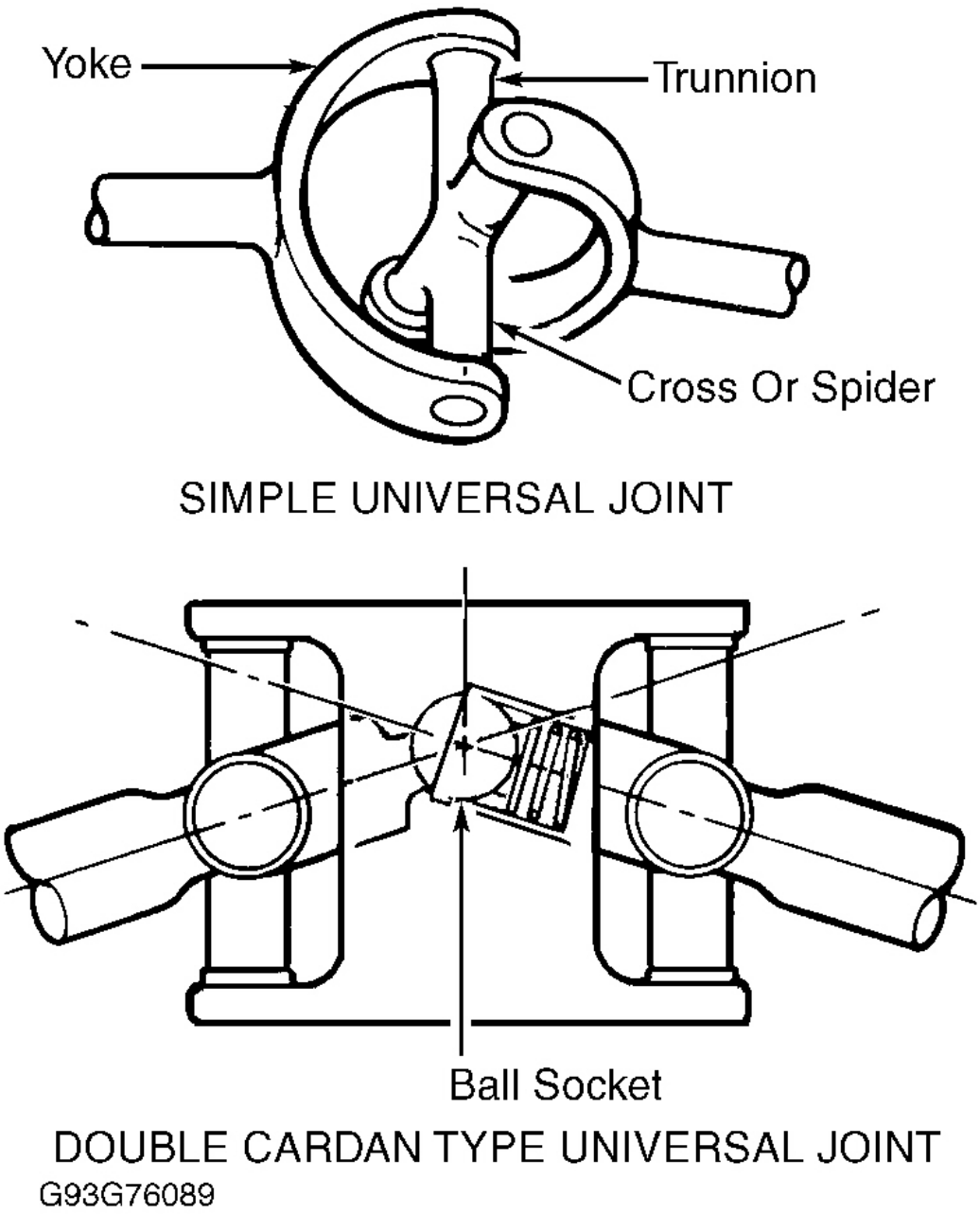

Fig. 2: Identifying Simple Universal Joint & Double Cardan Joint
Courtesy of GENERAL MOTORS CORP.

Center Bearing

Tighten drive shaft center bearing mounting bolts. If bearing insulator is deteriorated or oil-soaked, replace it.

Engine & Transmission Mounts

Tighten mounting bolts. Replace deteriorated mounts.

Tires & Wheels

Check tire inflation and wheel balance. Check for foreign objects in tread, damaged tread, mismatched tread patterns or incorrect tire size.

ADJUSTMENTS

DRIVE SHAFT PHASING

1-Piece Shafts

Ensure flange on each end of drive shaft is in same plane. Check for arrows on slip joint and drive shaft to aid in alignment. If flanges are not in same plane, remove slip joint flange and realign. See **Fig. 3** .

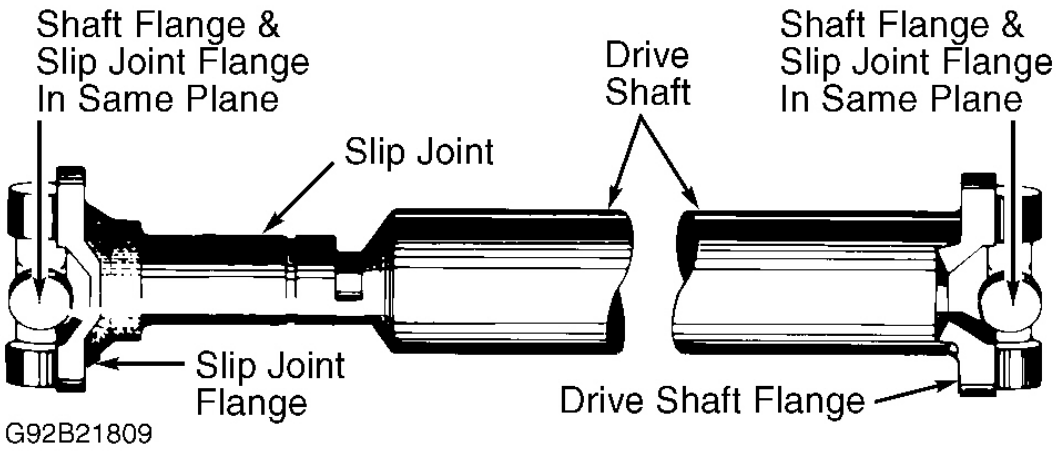

Fig. 3: Phase Alignment Of 1-Piece Drive Shaft

2-Piece Or 3-Piece Shafts

1. Rotate transmission until yoke ears are on a horizontal plane. If drive shaft is correctly installed, center line of yoke ears at each end of individual shafts will be parallel. If flanges are not in same plane, remove drive shaft. Install drive shaft with yokes aligned to a horizontal plane. See **Fig. 4** .
2. On models with 2-piece shafts, rotate transmission yoke until trunnion is in horizontal plane. Install front drive shaft with "U" joint trunnion in vertical plane. Connect bearing support to crossmember.
3. Ensure that front face of bearing support is perpendicular (90 degrees) to centerline of drive shaft. Install rear drive shaft with "U" joint trunnion of slip joint in vertical plane.

4. Set differential pinion yoke trunnion in vertical plane. Connect rear drive shaft to pinion yoke. If 2-piece shaft is correctly installed, centerline of trunnions at each end of individual shafts will be parallel. See **Fig. 4** .

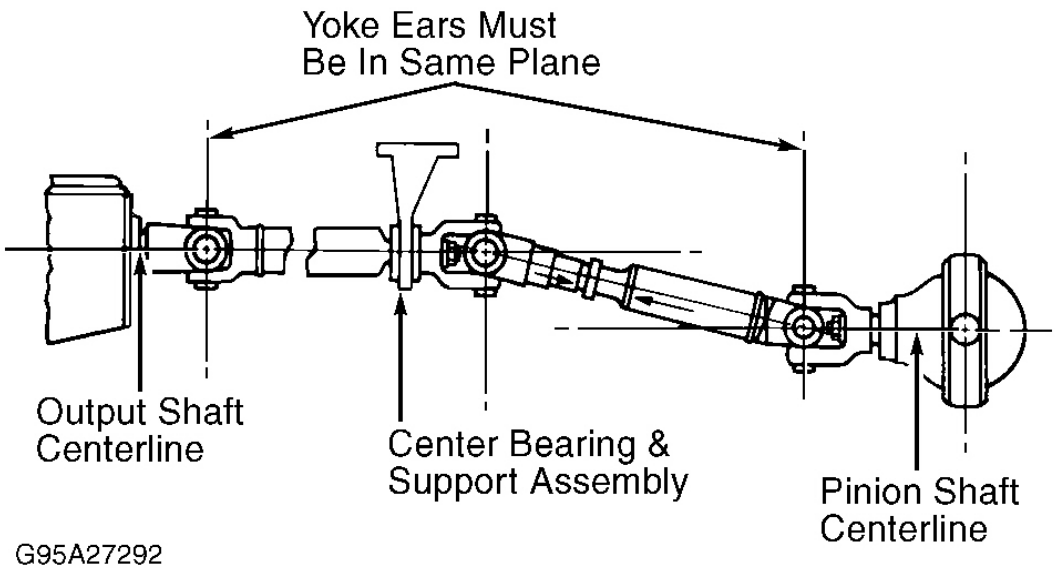

Fig. 4: Phase Alignment Of 2-Piece Drive Shaft (3-Piece Shaft Is Similar)

DRIVE SHAFT BALANCING

Adjustment

NOTE: DO NOT run engine without ram airflow across radiator for prolonged periods, as overheating of engine or transmission may occur.

1. Drive shaft imbalance may often be cured by disconnecting shaft and rotating it 180 degrees in relation to other components. Test by raising rear wheels off ground, and turning shaft with engine.
2. On most models, balance testing may be done by marking shaft in 4 positions, 90 degrees apart. Place marks about 6" (152 mm) forward of weld, at rear end of shaft. Number marks 1, 2, 3 and 4.
3. Place screw-type hose clamp so clamp head is in No. 1 position, and rotate shaft with engine. If there is little or no change, move clamp head to No. 2 position, and repeat test.
4. Continue procedure until vibration is at lowest level. If no difference is noted with clamp head moved to all 4 positions, vibrations may not be drive shaft imbalance.
5. If vibration is lessened but not completely gone, place 2 clamps at that point, and run test again. Combined weight of clamps in one position may increase vibration. If so, rotate clamps 1/2" apart, above and below best position, and repeat test.
6. Continue to rotate clamps as necessary, until vibration is at lowest point. If vibration level is still

unacceptable, leave rear clamp(s) in position and repeat procedure at front end of drive shaft. If vibration can be eliminated or reduced to acceptable levels using this test procedure, send drive shaft to balance shop for permanent balancing.

FLANGE ALIGNMENT & RUNOUT

Adjustment

1. All flanges must be perpendicular in both vertical and horizontal planes to engine crankshaft. Only exception is : "broken back" type driveline, which has flanges that are not perpendicular in vertical plane. See **Fig. 5** .

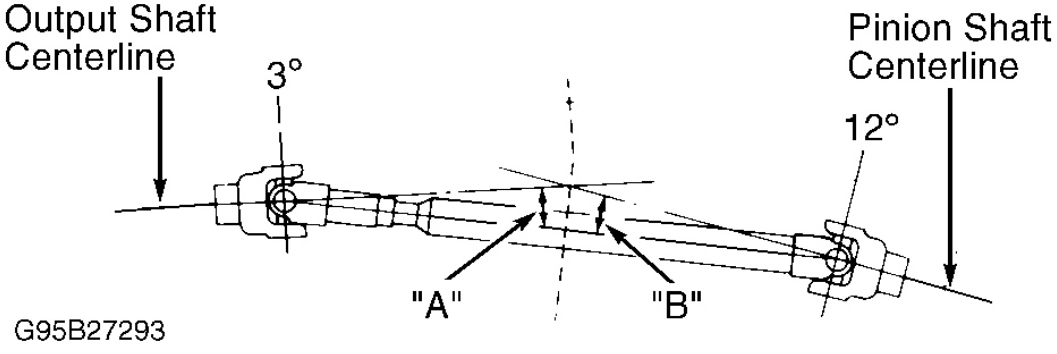

Fig. 5: "Broken Back" Type Drive Shaft Alignment (Typical)

2. With non-parallel or "broken back" type installation, working angles of universal joints of a given drive shaft should be equal. Angle "A" = angle "B".
3. This is calculated as follows: angle of output shaft centerline is subtracted from angle of drive shaft. Difference should equal angle of drive shaft subtracted from pinion shaft angle.
4. Parallel type joints maintain constant velocity between output shaft and pinion shaft. Vibration is minimized and component life maximized when universal joints are parallel.
5. Using dial indicator, measure runout of transmission flange, center bearing flange and pinion flange. If runout exceeds .003-.005" (.08-.13 mm), replace flange.
6. If dial indicator cannot be used, push rod with snug fit through flange bearing bore. See if it aligns with opposite flange bore. If not, replace flange. See **Fig. 6** .

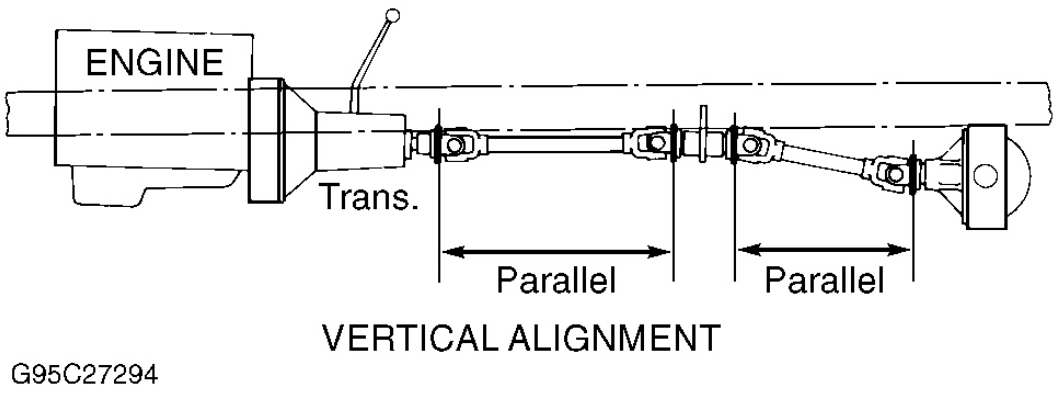

Fig. 6: Vertical Alignment Of Drive Shaft

7. Rotate transmission flange until it is vertical, measuring from side. Check center bearing and pinion flanges. They cannot be more than one degree off vertical. See **DRIVE SHAFT PHASING** .
8. Rotate transmission flange until it is vertical, measured from side. Measure angle from end and record it. Check all other flanges for same angle. They must be within 1/2 degree of each other. Adjust as required.
9. If difficulty is encountered when making these adjustments, horizontal alignment should be checked. Even though vertical alignment is correct, horizontal alignment can be badly out of adjustment. This is often found after major component replacement or repair of serious accident damage. See **Fig. 7** .

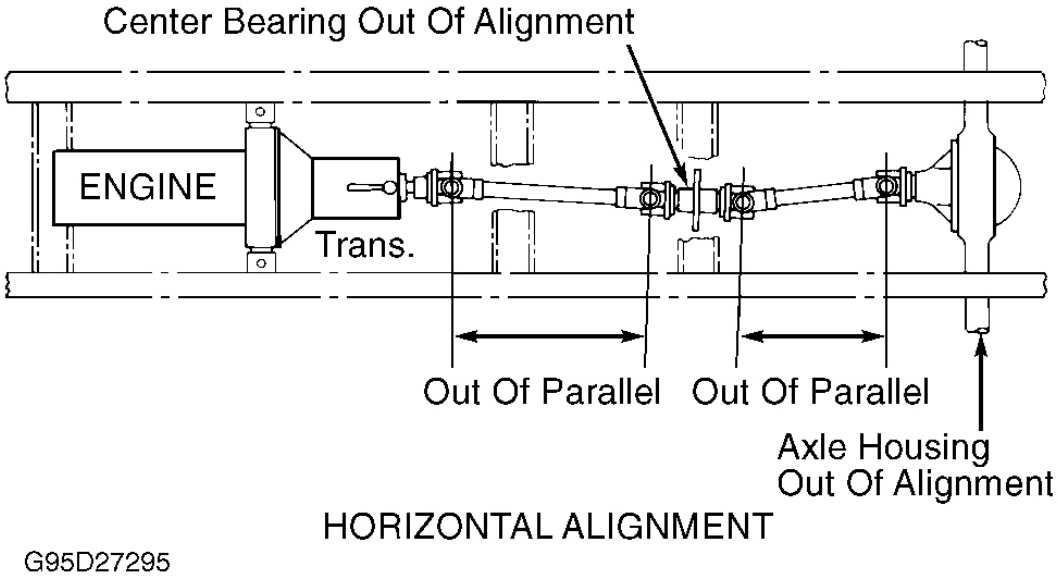

Fig. 7: Horizontal Alignment Of Drive Shaft

10. To make horizontal alignment checks, set up straightedges. See **Fig. 8** . Set transmission output flange horizontal and clamp straightedge to flange in a horizontal plane. Repeat procedure with drive pinion flange. Ensure that flanges are horizontal by checking angle of straightedge with spirit level.

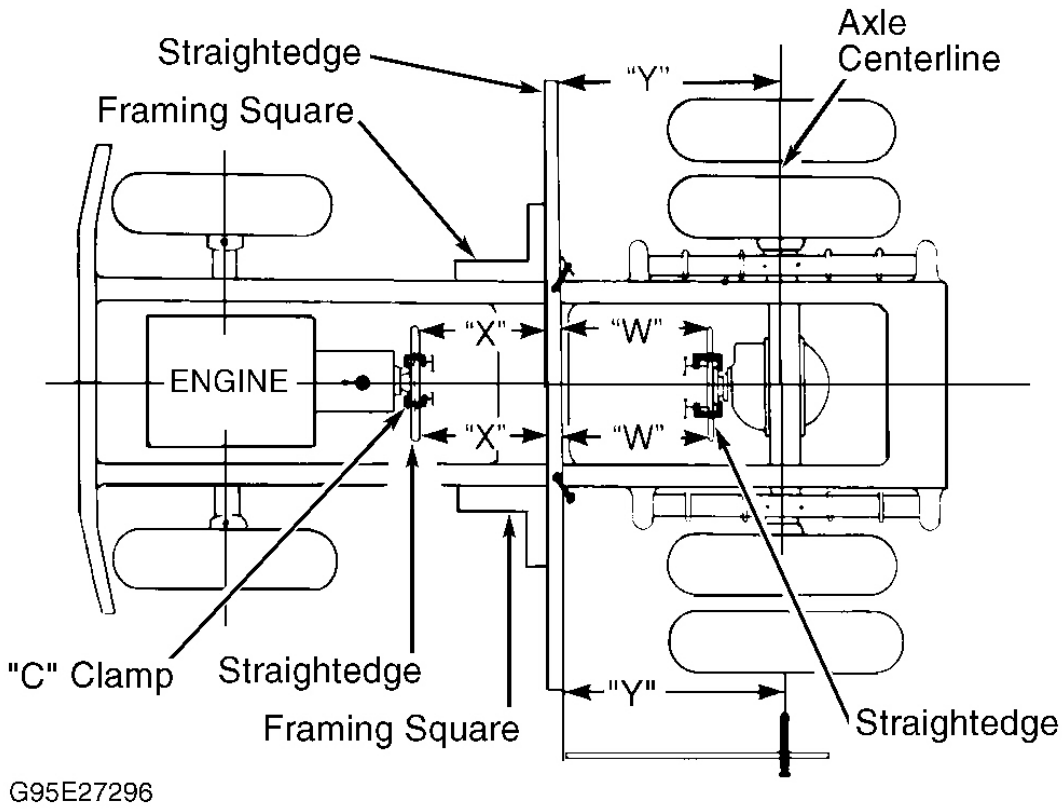

Fig. 8: Checking Horizontal Alignment

11. Using straightedge that is 12" (305 mm) longer than width of rear wheel track at 90 degrees, clamp to frame side rails. Use large framing squares to align straightedge with side rails.
12. Measure distance "X" at each side. If both measurements are not within 1/16" (1.6 mm) of each other, transmission flange is horizontally misaligned. See **Fig. 8** .
13. Measure distance "Y" (edge of straightedge to axle shaft centerline) at each side. If 2 dimensions are not within 1/8" (3.2 mm) of each other, axle housing is misaligned.
14. Measure distance "W" at each side. If both measurements are not within 1/16" (1.6 mm) of each other, pinion flange is horizontally misaligned.

DRIVE SHAFT RUNOUT

Raise vehicle so rear wheels can spin. Attach dial indicator to smooth place on vehicle underbody. A magnetic base dial gauge is recommended. DO NOT attach dial indicator base at a weld. With transmission in Neutral,

hand rotate axle pinion flange or transmission and take required dial indicator readings on drive shaft. See **DRIVE SHAFT RUNOUT (IN.)** table.

1-Piece Drive Shafts

If runout exceeds specifications, rotate drive shaft 180 degrees at pinion flange and install. Check runout again.

2-Piece Drive Shafts

Measure rear drive shaft runout. Reference mark position of rear drive shaft yoke to pinion flange. Remove rear drive shaft and measure front drive shaft runout, both on tube and at tapered hole on splined end. If runout exceeds specifications, rotate rear drive shaft 180 degrees at pinion flange and install. Check runout again.

3-Piece Drive Shafts

Check each shaft at its center and at both ends, approximately 3" (76 mm) from weld. If problem is found, disconnect each shaft, one at a time, and measure remaining shafts until problem shaft is found. Rotate shaft connected to problem shaft 180 degrees and install. Check runout again. If necessary, repeat procedure in an attempt to bring runout to specifications. If runout is still not within specifications, replace appropriate drive shaft. If runout still exceeds specifications, check for bent pinion.

DRIVE SHAFT RUNOUT (IN.)

Application	Front Check	Center Check	Rear Check
1-Piece			
Astro & Safari	.024	.024	.024
"C" & "K" Series			
Exc. Aluminum Graphite	.040	.050	.055
Aluminum Graphite	.040	.....	.040
"G" & "P" Series	.040	.050	.055
"S" & "T" Series	.024	.024	.024
2-Piece			
"C" & "K" Series			
Front			
With Slip Yoke	.025	.....	(1) .004
With Fixed Yoke	.040	.....	(1) .007
Rear	(2) .030	.040	.040
"G" Series	.030	.030	.035
"P" Series			
Front	.020	.....	(3) .008
Rear	(2) (4) .030	.030	.035
3-Piece			
"C" & "K" Series			
Pickup	.025	.040	.040

Suburban	.015	.010	.015
"P" Series	.015	.010	.015

(1) Measured on ground surface near spine, with drive shaft removed.

(2) Measured with rear shaft connected to front shaft. Runout of front drive shaft must be within specification.

(3) Measured at tapered hole in end of splined shaft, with rear drive shaft removed.

(4) Measured with front drive shaft disconnected. Runout of front drive shaft must be within specification.

UNIVERSAL JOINT MAINTENANCE

Lubrication

1. Whenever drive shaft is removed or slip yoke sticks in extension housing seal, clean yoke with solvent. Lubricate inside diameter of seal with synthetic oil seal lubricant and outside diameter of seal with transmission fluid.
2. Ball socket on double cardan joint requires periodic lubrication through provided fitting. Special Lubricant (1050679) is recommended by manufacturer. If lubrication fitting cannot be seen from beneath vehicle, double cardan joint may be lubricated from above using Adapter (J-25512-2) attached to end of a flex hose. See **Fig. 9** .

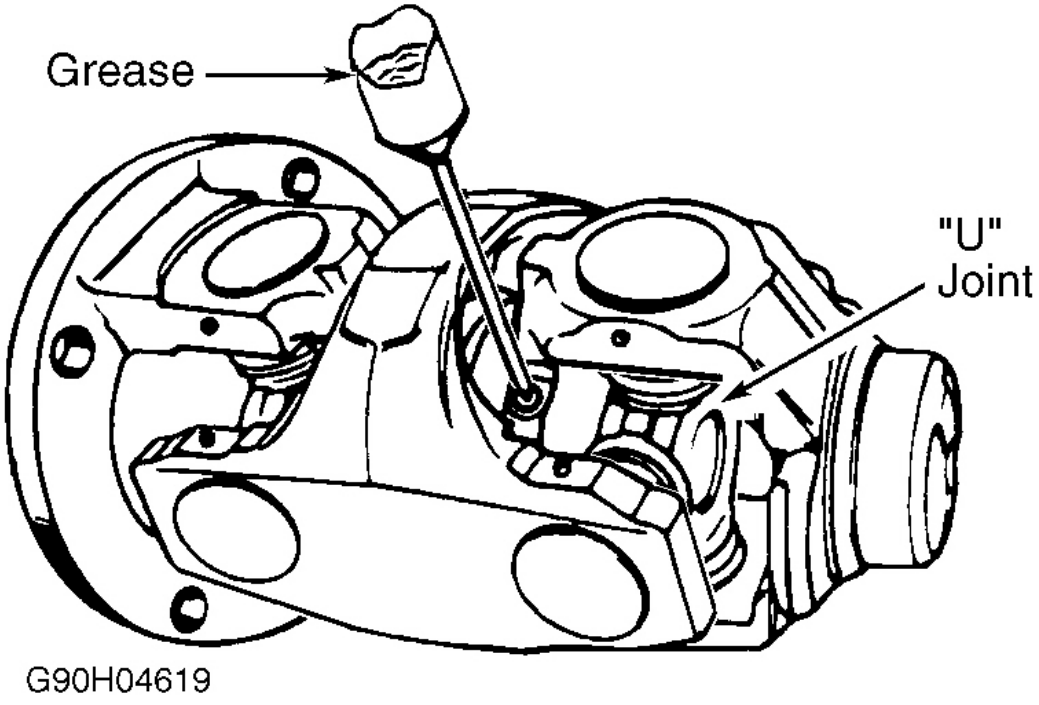

Fig. 9: Lubricating Ball Socket Of Double Cardan Joint
Courtesy of GENERAL MOTORS CORP.

OVERHAUL

NOTE: DO NOT disassemble universal joints unless external leakage or damage has occurred.

Before disassembly, scribe alignment marks on yoke and shaft for reassembly. If joints are rusted or corroded, apply penetrating oil before pressing out bearing cups or trunnion pin.

CROSS SHAFT & ROLLER TYPE UNIVERSAL JOINTS

Snap rings or injected plastic retainers may be used to retain bearing cups. Joints with snap rings may be disassembled and reassembled using same cross shaft and bearings. Joints with nylon retainers are disassembled by breaking nylon retainers; install NEW nylon retainers after service, or replace joints with joints that use snap rings.

Removal & Disassembly

1. Disconnect yoke or flange attaching bolts and remove drive shaft from vehicle. DO NOT use a pry bar to

hold drive shaft while loosening bolts, or damage to bearing seals may result. Scribe marks on yoke and shaft for reassembly reference.

2. Remove retaining strap (if equipped). Remove bushing retainers/snap rings from yoke. Press out bearing cups. Remove last bearing cup by pressing on end of cross shaft.
3. Remove cross shaft assembly from yoke. DO NOT remove seal retainers from cross shaft. Cross shaft and retainers are serviced as an assembly.

Reassembly & Installation

1. Coat roller bearings with lubricant. Fill bearing cups with grease. Place cross assembly in drive shaft yoke. Place bearing cups in position.
2. Press both bearing cups into yoke until retainers/snap rings can be installed. Ensure cross stays aligned in center of bearing cups while pressing into place. Install retainers/snap rings. Repeat procedure for remaining bearing caps. Install strap (if equipped). Install drive shaft in vehicle. Ensure scribed marks on yoke and shaft are aligned.

DOUBLE CARDAN TYPE UNIVERSAL JOINTS

Removal & Disassembly

1. Disconnect yoke and flange attaching bolts. Remove drive shaft from vehicle. Index mark joint, yoke flange and cross shafts for reassembly. See **Fig. 10** .
2. Pry out all snap rings and press bearing out far enough to allow bearing cup end to be clamped in vise. Tap on yoke until free of bearing cup.
3. Repeat procedure for remaining bearings. Remove remaining parts from center yoke assembly.

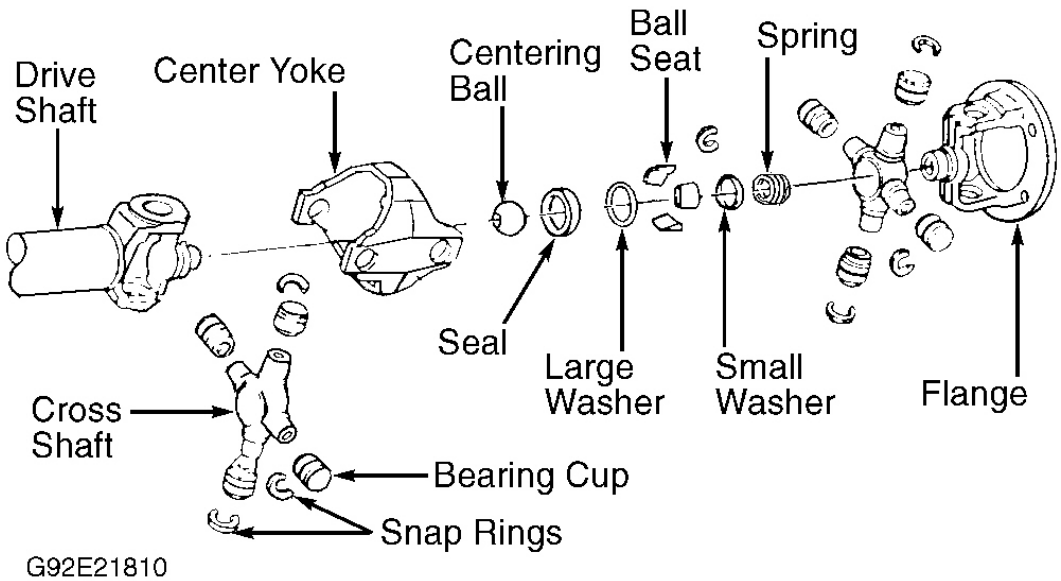

Fig. 10: Exploded View Of Double Cardan Type Universal Joint
Courtesy of GENERAL MOTORS CORP.

Reassembly

1. Pack all bearings with Lubricant (1050679). Assemble center yoke components in reverse order of disassembly.
2. Using arbor press or vise, press 2 opposing bearing cups into position at same time until all bearing cups are installed. Ensure cross shafts and yokes remain aligned during this process.
3. Check for free movement of joint. If bind exists, seat bearings by sharply rapping yokes with brass hammer. DO NOT hammer directly on bearings.

Installation

1. Before installing drive shaft, clean yoke and inspect machined surface for scratches, nicks or burrs.
2. Provide support for drive shaft during installation to prevent damage to universal joints. Position front end of shaft and align marks made during removal.
3. Install and attach 2 clamps to pinion yoke. Install 4 screws and lock washer assemblies on CV joint at transfer case. Use press bar to prevent assembly from rotating while attaching screw assemblies.